

Maryland Historical Trust

Maryland Inventory of Historic Properties number: BA 2863

Name: MD 144 over PATAPSCO RIVER

The bridge referenced herein was inventoried by the Maryland State Highway Administration as part of the Historic Bridge Inventory, and SHA provided the Trust with eligibility determinations in February 2001. The Trust accepted the Historic Bridge Inventory on April 3, 2001. The bridge received the following determination of eligibility.

MARYLAND HISTORICAL TRUST	
Eligibility Recommended _____	Eligibility Not Recommended <u>X</u>
Criteria: <u>  </u> A <u>  </u> B <u>  </u> C <u>  </u> D Considerations: <u>  </u> A <u>  </u> B <u>  </u> C <u>  </u> D <u>  </u> E <u>  </u> F <u>  </u> G <u>  </u> None	
Comments: _____ _____ _____	
Reviewer, OPS: <u>Anne E. Bruder</u>	Date: <u>3 April 2001</u>
Reviewer, NR Program: <u>Peter E. Kurtze</u>	Date: <u>3 April 2001</u>

*mg*

MHT Number BA-2863

**Location:**

**City/Town:** Ellicott City **Vicinity** X

**County:** Baltimore

**Ownership:** X State    County    Municipal    Other

**This bridge projects over: \_\_Road\_\_ Railway X Water \_\_Land**

**Is the bridge located within a designated district: \_\_yes X no**

\_NR listed district\_NR determined eligible district

locally designated other

Name of District

**Bridge Type:**

## Timber Bridge

Beam Bridge Truss-Covered Trestle

## Timber-and-Concrete

## Stone Arch

## Metal Truss

## Movable Bridge

Swing Bascule Single Leaf Bascule Multiple Leaf

Vertical Lift Retractable Pontoon

\_\_ Metal Girder

Rolled Girder   Rolled Girder Concrete Encased

Plate Girder    Plate Girder Concrete Encased

## Metal Suspension

## Metal Arch

### Metal Cantilever

## X Concrete

☒ Concrete Arch ☐ Concrete Slab ☐ Concrete Beam

## Rigid Frame

Other Type Name \_\_\_\_\_

**Describe Setting:**

Bridge 3086 carries MD 144 over the Patapsco River. MD 144 runs in an east-west direction and crosses the southern flowing Patapsco River. MD 144 is part of a nineteenth-century route that connected Baltimore with Frederick, Maryland.

**Describe Superstructure and Substructure:**

Bridge 3086 is a 201-foot triple-span, filled-spandrel concrete arch bridge built in 1914 and heavily rehabilitated in 1972. The bridge has two spans at 62 feet and one at 77 feet. There is a clear roadway width of 28 feet, with an overall width of 41 feet 10 inches. Cast in place barriers act as parapets for the bridge since its rehabilitation in 1972.

According to a 1997 inspection report, the undersides of all the arch spans have random cracks with heavy efflorescence. There is surface scaling and heavy spot spalling some with exposed rusty reinforcement bars and some areas have surface erosion. There are horizontal and vertical cracks near the springline with heavy efflorescence. The overall condition of the bridge is poor, and it has a sufficiency rating of 56.5.

The concrete railings are on the inside of the sidewalks and the pipe railings are on the outside. The concrete railings have surface erosion and vertical cracks that run along both sides and across the top with no exposed reinforcement bars.

**Discuss Major Alterations:**

According to the 1997 inspection report, in 1972 Zollman Associates, Inc completely rehabilitated this structure. The original deck and parapets were removed and replaced with modern equivalents. The piers and abutments were rehabilitated as well.

**History:**

**When Built:** 1914, 1972

**Why Built:** Replacement covered bridge that burnt in June 1914

**Who Built:** State Roads Commission

**Why Altered:** Deteriorated condition of all members.

**Was this bridge built as part of an organized bridge building campaign?** No, this bridge was not built as part of an organized bridge building campaign.

**Surveyor Analysis:**

**This bridge may have NR significance for association with:**

- ☐ A Events      ☐ Person  
☐ C Engineering/Architectural

This bridge was determined not eligible by the Interagency Review Committee in June 1996.

**Was this bridge constructed in response to significant events in Maryland or local history?**

The original bridge at this location was built by the Legislature in 1812 and was maintained until a flood in July 1868. The bridge was reconstructed in 1869 and was built of white pine timber covered with a shingle roof and weathered board sides. It consisted of 2 spans each 100 feet long. This bridge was destroyed by fire in June 1914. The State Roads Commission decided to rebuild the bridge of concrete and a three-span arch was designed. The site of the bridge was changed for a better approach to Ellicott City.

**Is the bridge located in an area that may be eligible for historic designation and would the bridge add to or detract from historic and visual character of the possible district?**

No, this bridge is not located in an area that is eligible for historic designation.

**Is the bridge a significant example of its type?**

No, this bridge had extensive changes and no longer represents the State Roads Commission's design efforts of 1914.

**Does the bridge retain integrity of the important elements described in the Context Addendum?**

The bridge does not retain integrity of the character defining elements of a concrete arch. The bridge has lost its original deck, parapets, top of its arch ring, and has had a large percentage of its piers and abutments replaced.

**Is this bridge a significant example of the work by the manufacturer, designer and/or engineer?**

No, this bridge is not a significant example of the work of a manufacturer, designer, or engineer.

**Should this bridge be given further study before significance analysis is made and why?**

No this bridge should be given further study.

**Bibliography:**

County inspection/bridge files \_\_\_\_\_ SHA inspection/bridge files   X  

**Other (list):**

Johnson, Arthur Newhall

1899 The Present Condition of Maryland Highways. In *Report on the Highways of Maryland*. Maryland Geological Survey, The Johns Hopkins University Press, Baltimore.

P.A.C. Spero & Company and Louis Berger & Associates

1995 Historic Highway Bridges in Maryland: 1631-1960: Historic Context Report. Maryland State Highway Administration, Maryland State Department of Transportation, Baltimore, Maryland.

State Roads Commission

1958 *A History of Road Building in Maryland*. State Roads Commission of Maryland, Baltimore, Maryland.

Tyrrell, H. Grattan

1909 *Concrete Bridges and Culverts for Both Railroads and Highways*. The Myron C. Clark Publishing Company, Chicago and New York.

**SURVEYOR:**

Date bridge recorded December 1997

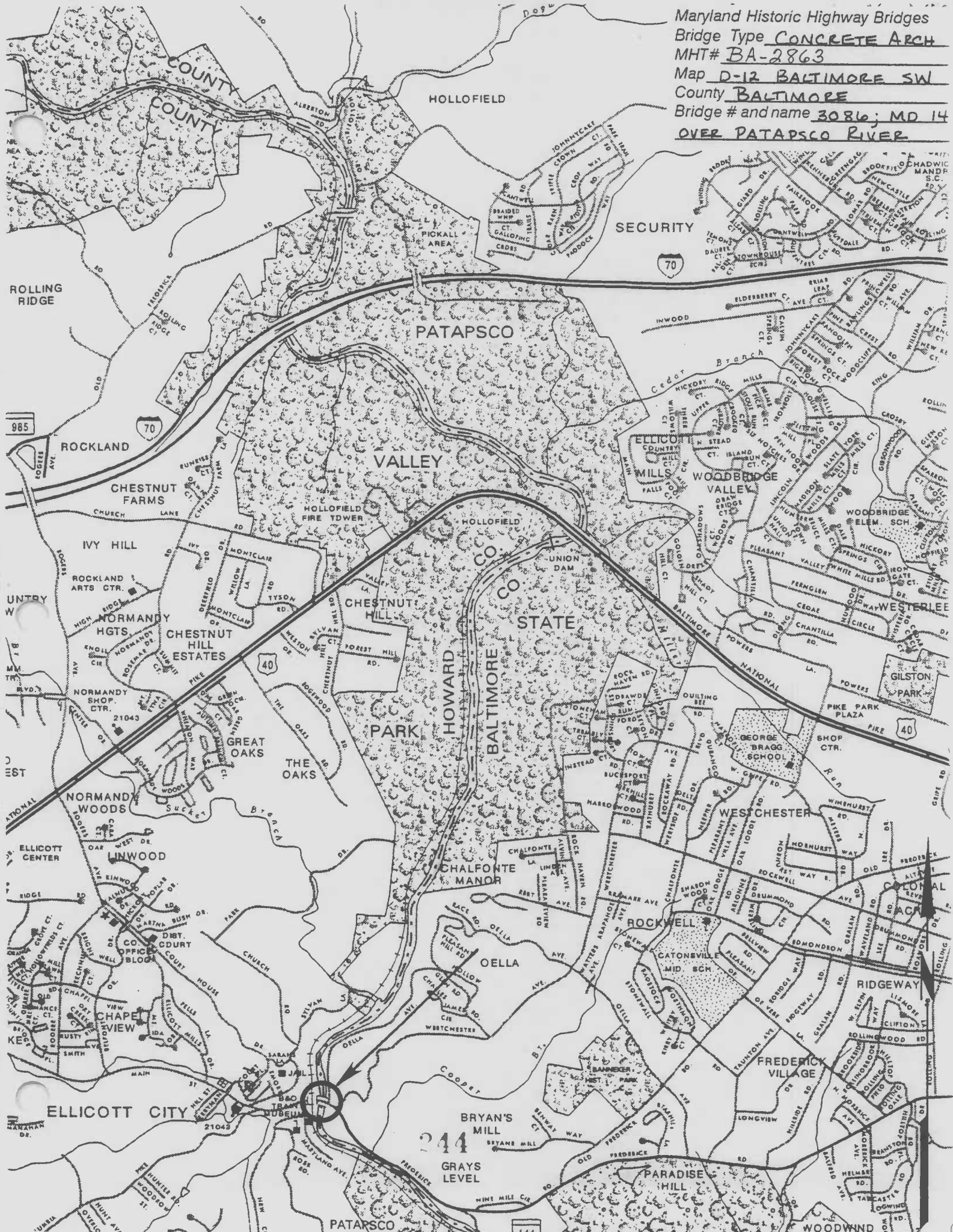
Name of surveyor Wallace, Montgomery & Associates / P.A.C. Spero & Company

Organization/Address P.A.C. Spero & Co., 40 W. Chesapeake Avenue, Baltimore, MD 21204

Phone number (410) 296-1635

FAX number (410) 296-1670

Maryland Historic Highway Bridges  
Bridge Type CONCRETE ARCH  
MHT# BA-2863  
Map D-12 BALTIMORE SW  
County BALTIMORE  
Bridge # and name 3086; MD 14  
OVER PATAPSCO RIVER





Inventory # BA-2863

Name 3086-MD44 OVER PATAPSCO RIVER

County/State BALTIMORE COUNTY/MD

Name of Photographer DAVE DIEHL

Date 2/95

Location of Negative SHA

Description EAST APPROACH LOOKING  
WEST

Number 1 of 378





Inventory # BA-2863

Name 3086- MD144 OVER PATAPSCO RIVER

County/State BALTIMORE COUNTY/MD

Name of Photographer PAVE DIEHL

Date 2/95

Location of Negative SHA

Description NORTH ELEVATION LOOKING  
SOUTHWEST

Number 28 of 398



Inventory # BA-2863

Name 2066- MD114 OVER PATASCO RIVER

County/State BALTIMORE COUNTY/MD

Name of Photographer DAVE DIEHL

Date 2/95

Location of Negative SHA

Description WEST APPROACH LOOKING  
EAST

Number 3 of ~~378~~ 378



Inventory # BA-2863

VOID

Name 3086-MD144 OVER PATAPSCO RIVER

County/State BALTIMORE COUNTY/MD

Name of Photographer DAVE DIENL

Date 2/95

Location of Negative SHA

Description SOUTH ELEVATION LOOKING  
NORTH

Number 4 of 8  
10 31



Inventory # BA-2863

Name 3086-MD144 OVER PATAPSCO RIVER

County/State BALTIMORE COUNTY/MD

Name of Photographer DAVE MEHL

Date 2/95

Location of Negative SHA

Description SOUTH ELEVATION LOOKING  
NORTHEAST

Number 5 of 398





Inventory # BA-2863

Name 3086 MD144 WER PATAPSCO RIVER

County/State BALTIMORE COUNTY/MD

Name of Photographer PAVE OREHL

Date 2/95

Location of Negative SHA

Description OLD STONE BUILDING ON  
NORTHWEST EMBANKMENT

Number 6 12 of 37 8



Inventory # BA-2863

Name 3086- MD144 OVER PATAPSCO RIVER

County/State BALTIMORE COUNTY / MD

Name of Photographer DAVE DIEHL

Date 2/95

Location of Negative SHA

Description RAILROAD BRIDGE OVER WEST  
APPROACH

Number 7 of 8



Inventory # BA-2863

Name 306-MD144 OVER PATAPSCO RIVER

County/State BALTIMORE COUNTY / MD

Name of Photographer DAVE DIEHL

Date 2/95

Location of Negative SHA

Description STONE STRUCTURE ALONG  
NORTHEAST EMBANKMENT

Number <sup>8</sup>14 of <sup>8</sup>31

INDIVIDUAL PROPERTY/DISTRICT  
MARYLAND HISTORICAL TRUST  
INTERNAL NR-ELIGIBILITY REVIEW FORM

Property/District Name: Bridge #3086, Frederick Rd. Bridge Survey Number: BA- 2863

Project: Enhancement Br #3068, MD 144 over Patapsco River Agency: FHWA/SHA

Site visit by MHT Staff: X no     yes Name                      Date                     

Eligibility recommended            Eligibility not recommended X

Criteria: X A     B X C     D Considerations:     A     B     C     D     E     F     G     None

Justification for decision: (Use continuation sheet if necessary and attach map)

Based on the information provided by SHA, Bridge ~~#3068~~ <sup>#3086</sup>, the Frederick Road Bridge, does not meet the National Register Criteria for listing because it lacks integrity. The concrete arch bridge composed of three arches was constructed in 1914 to plans by Daniel B. Luten, influential early 20th century bridge designer. The bridge conformed to Luten's "Highway Bridge of Plain Design" type and probably had a paneled, solid parapet characteristic of this type. It is one of less than a dozen extant Maryland Bridges associated with Luten. The bridge is the third bridge at the crossing of the National Road (Frederick Road) over the Patapsco River in Ellicott City. The crossing connected Ellicott City with the neighboring community of Oella. Both towns were important in the 19th century industrial development of the state. The bridge may have been eligible for the National Register of Historic Places under Criterion A for association with the development of transportation and commerce in Maryland and under Criterion C as work of a master, but it was substantially altered in 1974 by the addition of sidewalks. This entailed removal of the original parapet walls, widening and the addition of jersey barrier walls and pipe railing. The bridge is located between two National Register listed historic districts: Ellicott City Historic District and Ellicott Mills Historic District.

See attached information prepared by SHA  
Documentation on the property/district is presented in: Project File

Prepared by: Rita Suffness, SHA

Elizabeth Hannold  
Reviewer, Office of Preservation Services Date                     

NR program concurrence:     yes     no     not applicable

R. Anderson  
Reviewer, NR program

Date 3/3/94

*gms*

Survey No. BA - 2863

MARYLAND COMPREHENSIVE HISTORIC PRESERVATION PLAN DATA - HISTORIC CONTEXT

I. Geographic Region:

☐ Eastern Shore (all Eastern Shore counties, and Cecil)  
☐ Western Shore (Anne Arundel, Calvert, Charles, Prince George's and St. Mary's)  
☒ Piedmont (Baltimore City, Baltimore, Carroll, Frederick, Harford, Howard, Montgomery)  
☐ Western Maryland (Allegany, Garrett and Washington)

II. Chronological/Developmental Periods:

☐ Paleo-Indian 10000-7500 B.C.  
☐ Early Archaic 7500-6000 B.C.  
☐ Middle Archaic 6000-4000 B.C.  
☐ Late Archaic 4000-2000 B.C.  
☐ Early Woodland 2000-500 B.C.  
☐ Middle Woodland 500 B.C. - A.D. 900  
☐ Late Woodland/Archaic A.D. 900-1600  
☐ Contact and Settlement A.D. 1570-1750  
☐ Rural Agrarian Intensification A.D. 1680-1815  
☐ Agricultural-Industrial Transition A.D. 1815-1870  
☒ Industrial/Urban Dominance A.D. 1870-1930  
☐ Modern Period A.D. 1930-Present  
☐ Unknown Period ( ☐ prehistoric ☐ historic)

III. Prehistoric Period Themes:

IV. Historic Period Themes:

☐ Subsistence ☐ Agriculture  
☐ Settlement ☒ Architecture, Landscape Architecture, and Community Planning  
☐ Political ☒ Economic (Commercial and Industrial)  
☐ Demographic ☐ Government/Law  
☐ Religion ☐ Military  
☐ Technology ☐ Religion  
☐ Environmental Adaption ☐ Social/Educational/Cultural  
☒ ☒ Transportation

V. Resource Type:

Category: Structure

Historic Environment: Urban

Historic Function(s) and Use(s): Transportation

Known Design Source: Daniel B. Luten

## Attachment 6

CONTEXT--CONCRETE ARCH BRIDGES

John B. Leonard, a noted bridge engineer in California, noted in his 1912 article in The Architect and Engineer of California and the Pacific Coast States (P 90, Nov, 1912) that whereas in 1892 one could hardly find a concrete arch bridge, and by 1902 interest had hardly picked up, as there were less than one hundred, by 1912 interest had accelerated so dramatically there were upwards to ten thousand.

The first type of concrete arch structure to be constructed was the solid, filled, solid spandrel arch which was similar to a stone arch wherein a barrel arch carries fill and the solid spandrel wall serves a retaining wall to contain it. Concrete was an improvement over masonry for filled arch structures, for not only was it cheaper and easier to use, but it had greater flexibility than masonry. Whereas most stone arch bridges had limited span lengths and high rise-to-span ratio, reinforced concrete arches could be built in a variety of configurations, had a low rise-to-span ratio and could span greater lengths.

The earth filled type makes up the majority of the concrete arch structures in Maryland, as there are about one-half dozen open spandrel concrete arch structures. The typical arch structure before the turn of the century was an extremely simple, unadorned filled reinforced concrete arch with narrow roadway widths and relatively short spans. The State Roads Commission attempted more ambitious, larger, multiple arch structures soon after the turn of the century, beginning with its design of the Federalsburg bridge (5030) in Caroline County, built in 1910. In conjunction with a much touted re-surfacing of the main street with pitch macadam, a new material with which the agency had little prior experience, this four-span concrete arch bridge over the Marshyhope Creek was built to replace an old timber structure. With a total length of 216 feet, it was composed of four fifty-three foot long arches with a rise of about eight feet.

Commission records indicate that 13 concrete arch bridges were built between 1901 and 1911, and 5 bridges were built on US 1, the Washington-Baltimore Road, as part of its effort to complete that major north-south thoroughfare from Baltimore to Washington, D.C.

The concrete bridge with multiple arches and considerable length was frequently used for the replacement of the existing movable spans across the major waterways of Maryland in the first four decades of the twentieth century as concrete, with remarkable plasticity, could take on a variety of arch forms--open spandrel or earth-filled, as well as parabolic, elliptical, round-headed



and other configurations. In addition, the same concrete poured for load-bearing members can be poured into molds for decorative features as well--pylons, railings, lanterns, brackets, just the features called for by the proponents of the City Beautiful Movement to create monumental grand entrances into the cities and towns of Maryland. The small Eastern Shore town of Pocomoke City received a grand entrance befitting a major metropolitan area in the striking ensemble of bascule span, bridge tenders house, light standards and pylons built in 1920 by the Greiner Company under contract to Maryland SHA.

Concrete arch bridges were never standardized and typically were designed by city engineers or engineering firms. Most concrete arch designs were provided by State Roads Commission bridge engineers. Most of the consultants who developed designs under contract for concrete arch structures throughout Maryland prior to mid-century are unknown, and no designers or builders can be connected with any concrete arch structures constructed prior to 1900. Three significant exceptions to the customary anonymity of the designers of concrete arch structures occur in the first decade of the twentieth century, as there are known structures attributed to the firms of Nelson and Buchanan (a.k.a. the Nelson Bridge Company or Nelson Merydith Company), Daniel B. Luten (the Luten Bridge Company, and, later, the National Bridge Company), plus the J. E. Greiner Company.

Two other consulting engineers are known to have constructed (and possibly designed) concrete arch structures in Maryland in these years. The firm of D. B. Banks and F. W. Keyser constructed the 1908 Merryman Lane Bridge over Stony Run (BC 3405) to replace an iron structure, but are not known to have been prolific in Maryland (August 4, 1909 volume of Engineering Contracting, Vol. XXXII). Another firm is that of N. W. Douglas, which constructed BC-2202, US 40 (Edmonson Avenue) over Gwynn Falls and the Western Maryland Railroad in 1907. It is not known whether these firms designed bridges as well, or were contracted to fabricate them only.

T. M. Nelson, Daniel B. Luten and J. E. Greiner established firms which were very well known throughout the Mid-Atlantic states, but only the latter two appear to have established practices which spanned the continental United States. The J. E. Greiner Company, the only one of the three which is still in existence, established an international reputation, with a very wide range of major structures throughout the world.

The first of these three firms is T. M. Nelson, begun by a Pennsylvania native, who was engaged in the bridge business much earlier than the other two firms. In association with Gilbert he built the Carroll Road truss bridge in Baltimore County in 1879. After entering into a partnership with A. Buchanan in 1883, the resultant company of Nelson and Buchanan built numerous structures in the Mid-Atlantic area. The Nelson Construction Company, with offices located in Chambersburg and Pittsburgh,

Pennsylvania, designed two simple, short span, low-rise concrete bridges in Washington County in 1907, the Barnes Road Bridge (W5351) over Beaver Creek and the SHA Bridge 21023, carrying MD 56 bridge over Conococheague Creek. The Nelson Merydith Company, a later incarnation, had its offices in Chambersburg, Pennsylvania. It designed Bridge 2521, Clopper Road over Antietam Creek, in 1908. These three structures are the only concrete arch structures in Maryland attributable to T. M. Nelson-affiliated engineering firms.

The first two bridges, Barnes Road and MD 56, are rare surviving examples of what was undoubtedly a widely utilized arched-deck design, wherein the road bed arches over the crossing, approximating a silhouette characteristic of stone arch bridges, which are very plentiful in the countryside of western Maryland and Pennsylvania. Being rubble or dirt filled structures, the underside of the arches are solid. The last example, the Clopper Road Bridge, exhibits a different treatment to the underside of the arch, as the roadbed is supported on the spandrel walls and there is no fill beneath it. Thus the underside is hollowed out rather than being packed with rubble held in place by a concrete arch. The spandrel walls are solid. The hollowed out underside is distinguished by six integral transverse concrete beams which span the one-lane width between the spandrel walls. Thus an arch ring design has been substituted for the filled, solid arch. This bridge is particularly simple and spare, with only the pattern of the wooden formwork providing any surface interest in the spandrel walls. This innovation is just one step short of the pierced spandrel wall of the earliest bridge of this sort in Maryland--Bridge 1036, US 40A over Fifteen Mile Creek, in the neighboring county (Allegheny), constructed in 1915.

The second designer known to have constructed concrete arch bridges in Maryland is Daniel B. Luten, with his two companies, the Luten Bridge Company and the National Bridge Company. Luten was a tireless promoter of concrete arch structures, designing hundreds of such bridges throughout the east and midwest and the holder of more than fifty-two patents. His company catalogues promote the advantages of concrete bridges.

It is illustrative of Luten's widespread influence, and the increasing popularity of the concrete arch in the early twentieth century that John B. Leonard, a noteworthy California bridge engineer, in recognizing the major place of the concrete arch bridge in rapid expansion of America's roadways in the early twentieth century, reiterated Luten's endorsement of the concrete arch as "fulfilling the requirements of an ideal highway bridge" in an article contained in the Architect and Engineer of California and the Pacific Coast (November, 1912, pp. 90-94), in order to influence "those who have the general direction of municipal bridge work."

Luten's first bridge company, the National Bridge Company, was incorporated in 1902. According to a 1914 Luten publication, it

was responsible for both the contracting and constructing of its designs prior to 1905, whereas after that date its practice was restricted to engineering design and supervision only. In a 1917 publication entitled Reinforced Concrete Bridges (Indianapolis, Indiana, written and privately published by Daniel B. Luten), Luten illustrated the range of concrete arches that his firm had provided throughout the United States. They ranged from long-span high-level open spandrel arches to small highway bridges. On page 44 Luten contrasted a generic "Highway Bridge of Plain Design", with his characteristic paneled, solid parapet and low span with the "Park Bridge of Attractive Design" with a more decorative parapet composed of three stretches of open balustrade between with two short intermediate solid panels, and more substantial, articulated solid panels at either end.

Three Maryland examples are included in the text: Blair Bridge over the Potomac in Montgomery County (1910), the Frederick Road Bridge in Ellicott City (1915), and the Harford Avenue Bridge over Hering (sic) Run in Baltimore (1912). Of the ten or so Maryland bridges that Luten is documented as having designed or built, there is only one, the Sandy Island Bridge, which is an example of the "Park Design". The others conform generally to the "Highway Bridge" type, either the characteristic small structures or greatly enlarged versions of it, all with the paneled solid parapet wall (insofar as it is possible to determine using the bridge records at the SHA).

The Blair bridge is the oldest of the ten extant structures his firms designed for Maryland roads during the heyday of concrete arch use in the early decades of the twentieth century. This MD 320 structure (more correctly described as spanning the Northwest Branch in Prince George's County), although with a higher arch, conforms to his prototypical "Highway Bridge of Plain Design". This small structure was followed in short succession by three much larger structures over major waterways which were also illustrated in Luten's book on pages 45 and 31 respectively. Built in 1911, the 290 foot long Harford Road Bridge over Hering (sic) Run is composed of a massive 126 foot central span between two fifty foot spans. It is a very stark, unadorned structure prominently located in a Baltimore City park.

A third structure is at the crossing of Frederick Road over the Patapsco River in Ellicott City, an important location with a long and interesting history. The original bridge was built as part of the Frederick Turnpike soon after it was authorized by the Legislature in 1812. It was washed out in the flood of 1868, with a replacement covered wooden structure built the following year. After the wooden structure burned in 1914 the Commission decided to rebuild the bridge of concrete, with a temporary truss structure constructed in the interim. Luten's replacement structure built the following year is composed of three arches--a center, seventy-seven foot span between two sixty-two foot spans, with a low rise of twelve feet.

A fourth structure by the Luten Company illustrates that the State Roads Commission began to give special aesthetic consideration to concrete arch bridges if conditions or locations warranted it. In the early teens, the Commission relocated the Frederick Turnpike between the old and new city limits of Baltimore in order to improve the alignment and grade of the road. The original timber bridge had been built along with the turnpike and was maintained until 1889, when it was reconstructed of steel. In 1904 the Western Maryland Railroad built a second span adjacent to that one over the stream. The Commission straightened the alignment and commissioned a double 100-foot span concrete arch bridge forty-seven feet above the stream bed and fourteen feet above the grade of the old bridge. As it was located in the newly established Gwynns Falls Park, the bridge was specially designed to be aesthetically pleasing (1912-15 Annual Reports of the State Roads Commission, p. 68 and 118). This structure may be BC 2206, which may have been replaced in 1930.

The Sandy Island Bridge (5002) in Caroline County is the only example of the "Garden Bridge" design extant on Maryland roads. It consists of four roughly fifty foot concrete arch spans, and was built in 1919.

There are a number of very small structures extant in Maryland which were designed by one of Luten's companies, most often the York, Pennsylvania office of Luten Bridge Company. Two are located in Howard County: HO-20, and HO-8 which carry Folly Quarter Road and Sheppard Lane, respectively, over the Middle Patuxent River. Built in 1922 and 1930, they have the characteristic low rise, incised line in the solid spandrel wall which follows the arch of the rise, and projecting string course and parapet coping. The bridge plat on file with Howard County Land Records Office (File #14,728-3) records that bridge HO-8, the 22 foot long, rubble filled, closed spandrel bridge on Sheppards Lane, with its flaring wing walls on a 60° skew, was estimated to require 40 days to build at a total cost of \$1596.00.

Two were built in small Western Maryland towns--Keedysville and Frostburg. Built in 1915, the latter structure (AF01), carrying Bowery Street over a now abandoned railroad, has an uncharacteristically high arch, almost approaching a barrel form. For a Luten-designed structure in Maryland it is also unusual because of the classically designed bronze light standards, which, although remaining in fragments and in very poor condition reflects an aesthetic intent unexpected at a relatively insignificant crossing in a small town. Although disguised by bents which were installed to carry sidewalks on either side of the roadbed, the 1929 Keedysville Bridge (Bridge 21004) which was built to carry the Boonsboro-Shepherdstown Turnpike over the Antietam, features the characteristic low and wide single span, emphasized by a shallow incised line paralleling the line of the arch.

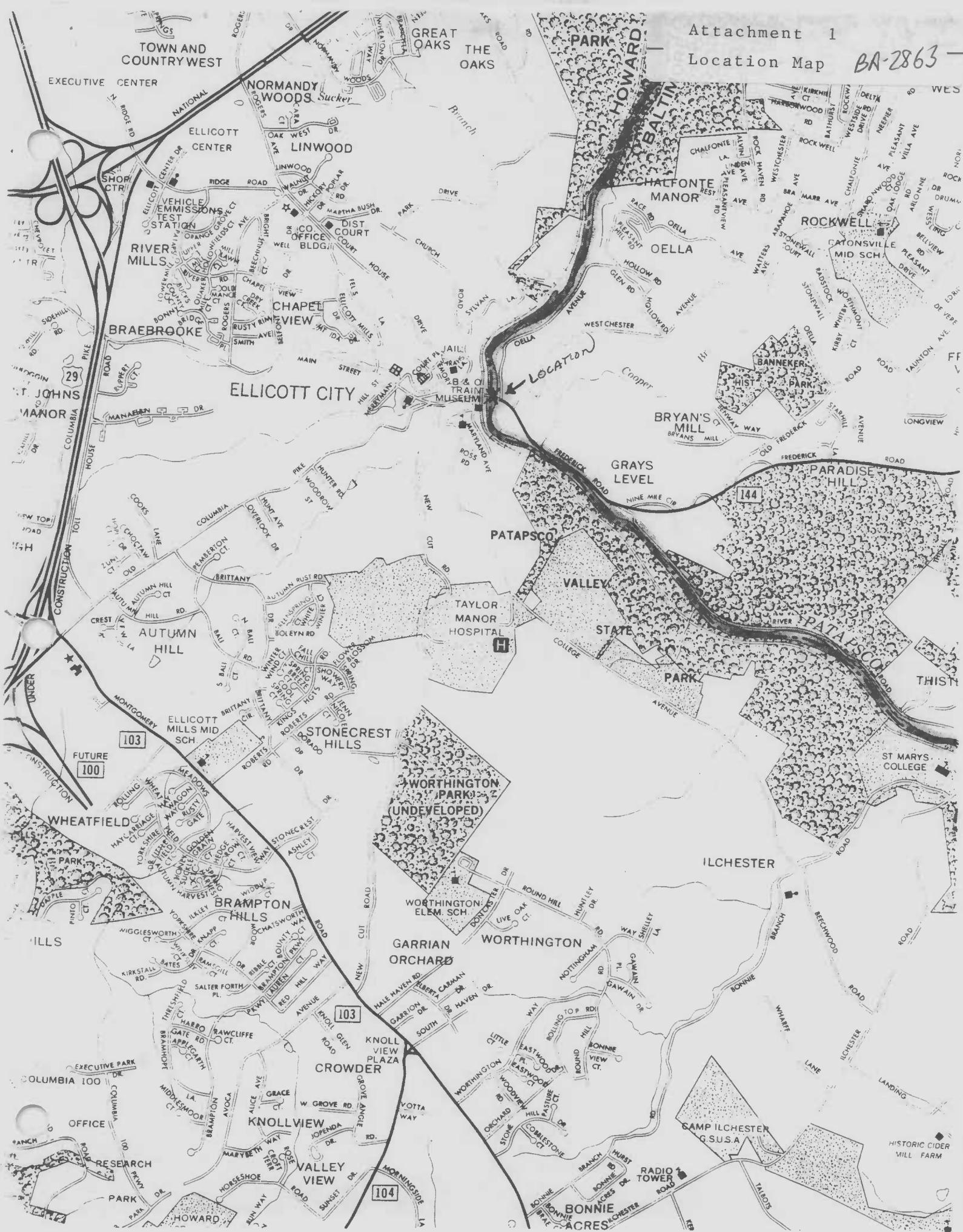
The third engineering firm which built a number of concrete arches, and probably more bridges of all types in Maryland than any other single firm, is J. E. Greiner Company. Shortly after the firm was founded in 1908 it was engaged to construct three structures in Baltimore City: the Poplar Grove Bridge (1910) and two 1912 Gunpowder Bridges, one over Peterson Run and one over Loch Raven. The firm went on to design many other structures in Maryland, including the toll crossings of the Potomac River and the Chesapeake Bay, truss bridges for the Loch Raven Reservoir, steel arch bridges in Baltimore City, and almost one-half of the extant movable span bridges in Maryland.

DANIEL B. LUTEN

## LUTEN BRIDGE COMPANY (ALSO NATIONAL BRIDGE COMPANY)

Daniel B. Luten is one of only three known designers of concrete arch bridges in Maryland. (Most concrete arch bridges are undocumented with respect to designer or builder). Luten was the designer of hundreds of such concrete arch bridges throughout the east and midwest and the holder of more than fifty-two patents, according to Who's Who in Engineering(1941). His firm evidently constructed about 15,000 bridges in the United States.

Graduating with a B.S. in Civil Engineering from the University of Michigan in 1894, he was an instructor in engineering at that university, and later Purdue University from 1895 to 1900. He was the chief engineer of the Luten Engineering Company in 1900 and 1901 before becoming president of the National Bridge Company in 1903, which resumed the original name in 1922. His company catalogues list the advantages of concrete bridges emphatically.









(SAVAGE)

47°30"

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON  
MR 2227

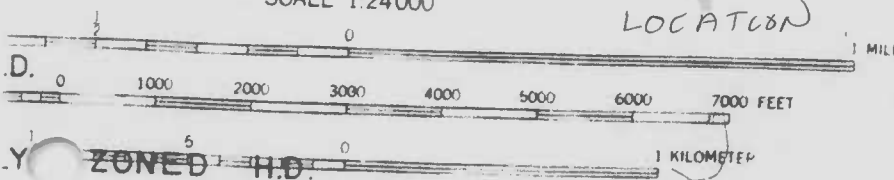
SCALE 1:24000

LOCATION

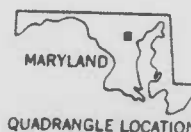
Ellicott City Quad

MD 144 Bridge over  
Patapsco River

Heavy-duty  
Medium-duty



CONTOUR INTERVAL 20 FEET  
DATUM IS MEAN SEA LEVEL



QUADRANGLE LOCATION

## COVERAGE

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON 25, D. C.  
FOR DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



~~BA-2864~~ BA-2863

Bridge # 3086



~~BA-2864~~ BA-2863

Bridge # 3086



~~BA-2864~~ BA-2863  
(3086)

Bridge # 308





BA-2864

bridge # 3086



~~BA-2864~~ BA-2863

Bridge # 3086



~~BA-2864~~ BA-2863

Bridge # 3086